REPORT

ON THE

CAWNPORE EXPERIMENTAL STATION

FOR THE KHARIF SEASON, 1885.

ALLAHABAD:

NORTH WESTERN PROVINCES AND OUDH GOVERNMENT PRESS.

1886.

No. 683A of 1886.

DEPARTMENT OF AGRICULTURE AND COMMERCE, N.-W. P. AND OUDH.

Dated Cawnpore, the 26th May, 1886.

From

Lieut.-Colonel D. G. PITCHER,

Offg. Dir, Dept. of Agri. and Commerce,

N.-W. Provinces and Oudh,

To

The CHIEF SECRETARY to GOVERNMENT,

N.-W. Provinces and Oudh.

Sir,

I have the honor to submit for the information of His Honor the Lieutenant-Governor and Chief Commissioner the report for the kharíf season of 1885 of the Cawnpore Experimental Station, now in the charge of Mir Muhammad Husain, M.R.A.C., Officiating Assistant Director, by whom the report has been compiled.

2. The report was due officially in December last; but owing to the lateness of the cotton crop, particularly in regard to exotic varieties, it has never been found practicable to render the report within the time fixed, and this year experiments with certain kharíf mixed crops has delayed the report still further.

3. *Character of the season.*—The season was marked by early and heavy rain with early cessation. Sorgho and maize suffered, but cotton appears to have done fairly well.

4. *Experiments with manures.*—Notwithstanding the eccentricities of the season, the established precedence of the various manures was fairly maintained; but the yield of both grain and straw was remarkably low all through and would appear to indicate that ordinary cultivators must have suffered considerably. That they did so was very practically established later on by the scarcity amounting to very grave inconvenience throughout the country of that winter fodder which in ordinary years is derived from the stalks and straw of kharíf crops.

5. *Comparative experiments: Saltpetre against certain organic manures.*—In these saltpetre maintained the lead. The most interesting fact in the table is the high value now obtained from woollen refuse, a waste product of the Cawnpore Mills which the latter at one time found the greatest difficulty in getting rid of on any terms The figures for pigs' droppings and for poudrette embody facts interesting to students of rural sanitation.

6. *Experiments in sowing maize after the American method.*—The sowings were personally conducted by the American gentleman at whose suggestions the experiment was carried out, but the results were not satisfactory ; and as the season was so unfavourable, it is hoped that next year may show better.

7. *Experiments with cotton.*—Used as the test crop in trial of deep *versus* shallow ploughing, the deep-ploughed plot as usual gave the best results. Tested for various methods of sowing, that of broadcast sowing proved most suitable for the slender plants of country cotton, while for the more bushy occidental varieties sowing in lines is better adapted. Cow-dung manure nearly doubled the produce as compared with that on unmanured plots. Eight different varieties were grown for comparison, with the result that Saháranpur seed gave the best results, ordinary country cotton and New Orleans following with about equal success.

8. *Oilseeds.*—Some very useful experiments were instituted this year under this heading in view of ascertaining the comparative outturn and value in the system of growing oilseeds alone and mixed. A connected series will in due time furnish figures now greatly needed for the annual harvest forecasts for the provinces.

Another useful series termed in the report "miscellaneous" was inaugurated to test the value of the method largely followed of sowing mixed crops in the kharíf, one of which is reaped with the rabi harvest and the other with the kharíf harvest, instead of sowing a full kharíf crop one year and a full rabi the next. The series will be continued until sufficient figures have been collected to admit of true deductions being drawn.

9. A small experiment was tried in growing sugarcane according to the Mauritius method as compared to that in vogue in the district. So far as the experiments went, the Mauritius method proved no more superior to the local methods than did the Demarara plan tried on the farm about two years ago.

10. *Ensilage.*—This system can no longer be considered in the light of an experiment, as it has been successful on the Station for some three years past and silos form a regular part of the establishment. The inopportune rains and consequent failure of kharíf fodder proved this year the opportunity of ensilage. In the previous year a great deal more fodder had been ensilaged than could at the time be got rid of, and it was reserved as an experiment against time. When opened after 18 months it was found so good that the farm cattle were fed almost exclusively on the ensilaged juár for about two months, keeping excellent condition. The result was a large saving in money which would otherwise have had to be expended in buying foddor at the very high rates ruling.

Grass was not so successful as juár. It is to be noted that the offensive smell so often complained of in regard to silos is not a concomitant of those at Cawnpore.

11. *Implements.*—Of these mention has already been made in the annual list of implements, &c., tried, which has been submitted to Government. The centrifugal sugar separator introduced by the makers of the Behea mill promises to be a most useful addition to implements suited to the country. In regard to Rogers' sugar mill, it is true that the weight renders it less portable than mills with wooden stands; but, on the other hand, weight lends stability, an object most desirable to attain in working any mill.

Bull's improved dredger has proved a decided success. Four are now in use and orders have been received for six more, which are now on their way from Bombay. It greatly cheapens and expedites well-sinking when sand is met with.

12. Mir Muhammad Husain was in entire charge of the farm for the period under report and had much difficulty to contend with in the character of the season.

I have the honor to be,

SIR,

Your most obedient servant,

D. G. PITCHER, LIEUT.-COL.,

Offg. Director.

REPORT

ON THE

CAWNPORE EXPERIMENTAL STATION

FOR THE KHARIF SEASON 1885.

1. *Cause of delay in submission.*—As kharif report includes cotton and ensilage experiments, and in the season under report it included arhar and sugarcane, therefore the submission of this report has necessarily been delayed. The picking of Nankin cotton kept on as late as the last week of January, and of other varieties a little earlier than that; arhar was harvested only a day or two before the writing of this report was commenced; milling sugarcane was not over till the end of January, and the silos were opened on the 16th of April last.

2. *Rainfall.*—As a rule, the rainfall is never or very seldom up to the satisfaction of agriculturists: there always remain more or less complaints of its being inopportune and unfairly distributed.

Last year the complaint was greater at the beginning: just at the very ploughing and sowing time it had been excessively heavy, while at the end it ceased altogether. It affected every crop, especially sorgho and maize. Nankin cotton stood more vigorously against the unfavourable circumstances than other varieties. On the whole, cotton did not suffer much on the farm.

3. The following table will show the rainfall of last two years:—

Month.	Rainfall in inches.			
	At the Station.		*At the City.*	
	In 1884.	In 1885.	In 1885.	Mean of 15 years
June	2·57	5 8	6·69	2·61
July	3·11	16·0	14·62	9·69
August	24·47	18·8	15·66	7·89
September	9·32	2·2	1·57	5·31
October	6·17	...	0·29	1·06
November	...	...	...	...
December	...	0·9	2·56	26·56

4. *Major heads of experiments.*—In the season under review the following operations comprised experiments:—

I.—Maize.

(*a*) Treatment of standard and duplicate plots as usual.
(*b*) Effect of certain animal manures.
(*c*) Effect of special manures.
(*d*) American way of sowing *versus* country fashion.

II.—Cotton.

(*a*) Effect of deep and shallow ploughing from improved and country ploughs.
(*b*) The produce from different varieties of seed.
(*c*) Effect of different kinds of sowings on country seed.
(*d*) Effect of different kinds of sowings on Nankin seed.

III.—Oilseed.

(*a*) Black til.
(*b*) White til: (1) early variety; (2) late variety.
(*c*) Mixed crop (til, maize, cotton, pulses, &c.)

IV.—Sugarcane.

(*a*) Sugarcane *versus* sorgho.

(*b*) Effect of different kinds of sowings.

V.—Miscellaneous.

(*a*) Money value of mixed kharíf crop against a crop of wheat.

(*b*) Outturn of pulses and millets.

VI.—Ensilage.

(*a*) Silo opened after 18 months.

(*b*) Silo opened within 9 months.

5. A copy of the programme which was drawn up for the works of this season is appended at the end of this report. It will show the detail of the operation of the kharíf sowing.

6. *Maize.*—(*a*) *Experiment in a series of* 26 *plots termed standard and duplicate, each division having* 13 *plots.*—Twenty out of the plots (26) have been under the same experiments for the last six years. Three new plots have been added in each division from 1884 for sheep-dung, ashes of cowdung top dressed with saltpetre, and poudrette respectively. Each plot is 400 square yards.

The manure applied and the crops sown for the last five years are shown in the following return :—

Table I.

Number of plot.		1880-81.		1881-82.		1882 83.		1883-84.		1884-85.		1885-86.	
		Manure.	Crop.	Manure.	Crop.	Manure.	Crop.	Manure.	Crop.	Manure.	Crop.	Manure.	Crop.
I	Standard,	Dung	Maize & wheat,	Dung	Maize ...	Dung	Maize ...	Dung	Maize ...	Dung	Maize,	Dung	Maize.
	Duplicate,	*Nil* ...	Maize ..	Ditto ...	Maize & wheat,	Ditto ...	Ditto ..	Ditto ...	Wheat ...	Ditto ..	Ditto,	Ditto ...	Wheat.
II	Standard,	Dung and bone-dust,	Maize & wheat,	Dung and bone-dust,	Maize ...	Dung and bone-dust,	Ditto ...	Dung and bone dust,	Maize ...	Dung and bone-dust.	Ditto,	Dung and bone-dust,	Maize.
	Duplicate,	*Nil* ...	Maize ...	Ditto ...	Maize & wheat,	Ditto ...	Ditto ..	Ditto ...	Wheat ...	Ditto ..	Ditto,	Ditto ...	Wheat.
III	Standard,	Dung and calcic sulphate.	Maize & wheat,	Dung and calcic sulphate.	Maize ...	Dung and calcic sulphate.	Ditto ...	Dung and calcic sulphate.	Maize ..	Dung and calcic sulphate.	Ditto,	Dung and calcic sulphate.	Maize.
	Duplicate,	*Nil* ...	Maize ...	Ditto ..	Maize & wheat,	Ditto ...	Ditto ...	Ditto ...	Wheat ...	Ditto ...	Ditto,	Ditto ..	Wheat.
IV	Standard,	Ashes of dung ...	Maize & wheat,	Ashes of dung ...	Maize ..	Ashes of dung ...	Ditto ...	Ashes of dung ...	Maize ...	Ashes of dung ...	Ditto,	Ashes of dung ...	Maize.
	Duplicate,	*Nil* ..	Maize ...	Ditto ...	Maize & wheat,	Ditto ...	Ditto ...	Ditto ...	Wheat ...	Ditto ..	Ditto,	Ditto ...	Wheat.
V	Standard,	Poudrette ..	Maize & wheat	Poudrette ...	Maize ...	Potassic nitrate ...	Ditto ...	Potassic nitrate ...	Maize ...	Potassic nitrate ...	Ditto,	Potassic nitrate ...	Maize.
	Duplicate,	*Nil* ...	Maize ...	Potassic nitrate ...	Maize & wheat,	Ditto ...	Ditto ...	Ditto ...	Wheat ...	Ditto ...	Ditto,	Ditto ..	Wheat.
VI	Standard,	No manure ..	Fallow ...	No manure ...	Fallow ...	No manure ...	Fallow ...	Potassic nitrate and bone-dust.	Maize ..	Potassic nitrate and bone dust.	Ditto,	Potassic nitrate and bone-dust.	Maize.
	Duplicate,	*Nil* ...	Maize ..	Potassic nitrate and bone-dust.	Maize & wheat,	Potassic nitrate and bone dust.	Maize ...	Ditto ...	Wheat ...	Ditto ..	Ditto,	Ditto ...	Wheat.
VII	Standard,	Bone superphosphate.	Maize & wheat,	Bone superphosphate.	Maize ...	Bone superphosphate.	Ditto ..	Potassic nitrate and bone-dust superphosphate.	Maize ..	Potassic nitrate and bone superphosphate.	Ditto,	Potassic nitrate and bone superphosphate.	Maize.
	Duplicate,	*Nil* ...	Maize ...	Ditto ..	Maize & wheat	Ditto ..	Ditto ...	Ditto ...	Wheat ...	Ditto ...	Ditto,	Ditto ...	Wheat.
VIII	Standard,	Bone-dust ...	Maize & wheat,	Bone-dust ...	Maize ...	Bone-dust ...	Ditto ...	Sheep-dung and bone-dust.	Maize ..	Sheep dung and bone-dust.	Ditto,	Sheep-dung and bone-dust.	Maize.
	Duplicate,	*Nil* ...	Maize ...	Ditto ...	Maize & wheat,	Ditto ..	Ditto ...	Ditto ...	Wheat ...	Ditto ..	Ditto,	Ditto ..	Wheat.
IX	Standard,	Calcic sulphate ...	Maize & wheat,	Calcic sulphate ..	Maize ...	Calcic sulphate ..	Ditto ...	Sheep dung and calcic sulphate.	Maize ..	Sheep dung and calcic sulphate.	Ditto,	Sheep-dung and calcic sulphate.	Maize.
	Duplicate,	*Nil* ...	Maize ...	Ditto ..	Maize & wheat,	Ditto ...	Ditto ...	Ditto ...	Wheat ...	Ditto ..	Ditto,	Ditto ..	Wheat.
X	Standard,	No manure ...	Maize & wheat,	No manure ...	Maize ...	No manure ...	Ditto ...	No manure ...	Maize ..	No manure ...	Ditto,	No manure ...	Maize.
	Duplicate,	*Nil* ...	Maize ...	Ditto ...	Maize & wheat,	Ditto ...	Ditto ...	Ditto ...	Wheat ...	Ditto ...	Ditto,	Ditto ...	Wheat.
XI	Standard,	,, ...	Pulses ...	Dung	Cereals ...	Green soiled with hemp.	Barley..	Ditto ...	Sorgho ...	Ashes of dung and saltpetre.	Ditto,	Ashes of dung and saltpetre.	Maize.
	Duplicate,	,, ...	Maize ...	No manure ...	Cotton ...	No manure ...	Juár and gram	Ashes of dung and saltpetre.	Sorgho and wheat.	Ditto ...	Ditto,	Ditto ...	Wheat.
XII	Standard,	,, ...	Pulses ...	Dung	Cereals ..	Green soiled with hemp.	Barley...	No manure ...	Sorgho ..	Sheep-dung ...	Ditto,	Sheep dung ...	Maize.
	Duplicate,	,, ...	Maize ...	No manure ..	Cotton ...	No manure ..	Juár and gram.	Sheep-dung ...	Sorgho and wheat.	Ditto ...	Ditto,	Ditto ...	Wheat.
XIII	Standard,	,, ..	Pulses ...	Dung	Cereals ...	Green soiled with hemp.	Barley...	No manure ...	Sorgho ..	Poudrette ..	Ditto,	Poudrette ...	Maize.
	Duplicate	,, ...	Maize ..	No manure ...	Cotton ...	No manure ...	Juár and gram?	Poudrette ...	Sorgho and wheat.	Ditto ..	Ditto.	Ditto ...	Wheat

Other treatment of the plots in question was as follows :—

Ploughing	...	...	...	...	...	...	2
Weeding	...	...	...	...	...	...	2
Irrigation	...	...	...	...	...	...	*Nil*
Seed maize	...	...	...	...	...	...	12 lb. per acre.

The following table shows the outturn obtained from each plot during the year under report and the year before it :—

Table II.

No. of plot.	Manure and rate per acre.	Year.	Outturn per acre.			
			Grain.		*Stalk and leaf.*	
			Standard.	Duplicate.	Standard.	Duplicate.
			lb.	lb.	Mds.	Mds.
1	Cowdung, 180 maunds	1885 ...	266·2	605·0	30·3	43·2
		1884 ...	1860·0	1580·4	89·6	75·2
2	Cowdung, 180 maunds; bone-dust, 360lb. ...	1885 ...	471·9	629·2	51·6	44·7
		1884 ...	1632·0	1568·4	76·8	85·6
3	Cowdung, 180 maunds; calcic sulphate, 240 lb.	1885 ...	435·6	641·3	40·5	37·1
		1884 ...	1914·0	1524·0	96·0	80·8
4	Ashes of 180 maunds dung	1885 ...	326·7	314·6	37·9	27·7
		1884 ...	1230·0	806·4	69·6	48·8
5	Potassic nitrate, 240 lb.	1885 ...	871·2	484·0	60·05	34·5
		1884 ...	1608 0	876·0	77·6	58·4
6	Ditto bone-dust, 360 lb.	1885 ...	435·6	629·2	45·1	43·3
		1884 ...	1644·0	1200·0	73·6	56·8
7	Ditto bone superphosphate, 240 lb. ...	1885 ...	520·3	762·3	38·8	40·4
		1884 ...	1260 0	852·0	76·0	55·2
8	Sheep-dung, 180 maunds ; bone-dust, 360 lb.	1885 ...	508·2	508·2	46·1	41·9
		1884 ...	1518 0	1062·0	80·8	53·6
9	Sheep-dung, 180 maunds ; calcic sulphate, 240 lb.	1885 ...	329·7	520·3	28·9	38·3
		1884 ...	1359·6	1074·0	70·4	58·4
10	No manure	1885 ...	338·8	193·6	38·3	36·0
		1884 ..	1044·0	564·0	70·4	43·2
11	Ashes of 180 maunds dung and potassic nitrate, 240 lb.	1885 ...	726·0	895·4	79·3	71·5
		1884 ...	1514·4	1134·0	73·6	68·8
12	Sheep-dung, 180 maunds	1885 ...	290·4	847·0	24·05	50·4
		1884 ...	1316·4	1167·6	73·6	69·6
13	Poudrette, 180 maunds	1885 ...	450·7	859·1	38·7	45·2
		1884 ...	1932·0	1728·0	96·8	86·4

From the figures tabulated in the foregoing statement the effect of bad season is clearly visible. It is said that throughout the province maize and early-sown cotton crops have suffered a great deal. The plots, being situated on somewhat low-lying ground, never got free of water when the plants were growing. Although due attention had been paid to drain off the water by surface drainage, yet, owing to the continuous rain of day and night, the incoming quantity of it always exceeded the amount discharged out.

Although the season had been very unfavourable and the outturn extremely poor, still in most cases the fertilizers experimented upon have proved true in their effects, —the farmyard manure stimulated with some artificial fertilizer has given better result than the former applied singly : for instance, cow-dung and calcic sulphate, sheep-dung and bone-dust, &c.

Potassic nitrate too did not fail to produce its recognised effect, but gave a comparatively better crop. Poudrette has proved to be a better manure than cattle-dung.

The excess of rain has not only injured the grain but produced the same effect over the stalks of the crop.

Duplicate plots in which maize and wheat are sown alternately have nearly in all cases given a better crop this time than the standard plots in which maize is sown year after year. But this is contrary to the previous results. This exception may be attributed to the excess of rain, which, perhaps, decomposed organic

matters deposited by the roots of the previous wheat crop quickly and made it available for maize in the time of need. The other fertilizers applied to the plots no doubt were washed away to a great extent by surface drainage, while the organic matter left by the previous crop, the wheat, was being decomposed and got ready just in time for being used by the plant.

7. (*b*) *Experiments to determine the comparative value of certain animal manures and saltpetre.*—The following table shows the crops produced during the current and the last five seasons in the eight plots under this experiment:—

Table III.

No. of plots.	1880.		1881.		1882.		1883.		1884.		1885.	
	Manure.	Crop.	Manure.	Crop.	Manure.	Crop.	Manure.	Crop.	Manure.	Crop.	Manure.	Crop.
I	Sheep dung.	Wheat	*Nil.*	Cotton	*Nil*	Wheat	Woollen refuse.	Maize & barley.	Woollen refuse.	Maize.	Woollen refuse & lime.	Maize.
II	Do.	Do.	Do.	Do.	Do.	Do.	Do.	Do.	Sheep-dung.	Do.	Sheep-dung.	Do.
III	Do.	Do.	Do.	Do.	Do.	Do.	Brickiln refuse.	Do.	Cow-dung.	Do.	Cow-dung.	Do.
IV	Do.	Do.	Do.	Do.	Do.	Do.	Poudrette.	Do.	Poudrette.	Do.	Poudrette.	Do.
V	Do.	Do.	Do.	Do.	Do.	Do.	*Nil.*	Do.	Horse-dung.	Do.	Horse-dung.	Do.
VI	Do.	Do.	Do.	Do.	Do.	Do.	Do.	Do.	Pigs' droppings.	Do.	Pigs' droppings.	Do.
VII	Do.	Do.	Do	Do.	Do.	Do.	Do.	Do.	Saltpetre.	Do.	Saltpetre.	Do.
VIII	Do.	Do.	Do.	Do.	Do.	Do.	Do.	Do.	*Nil.*	Do.	*Nil.*	Do.

Other treatment of the plots during the year was as follows:—

Ploughings	2
Weeding	1
Irrigation	*Nil.*
Seed and rate per acre	Maize. 12 lb.

The outturn of each plot is shown in the following table:—

Table IV.

No. of plots.	Manure and rate per acre.	*Outturn per acre.*	
		Grain.	Stalk and leaf.
		lb.	Mds.
1	Woollen refuse, 120 mds.	1,185·8	80·7
2	Sheep-dung, 120 ,, ...	780·4	72·7
3	Cow-dung, 120 ,, ...	780·4	54·4
4	Poudrette, 120 ,, ...	847·0	75·1
5	Horse-dung, 120 ,, ...	968·0	73·3
6	Pigs' droppings, 120 ,, ...	1,016·4	80·1
7	Potassic nitrate (saltpetre), 3 mds.	1,306·8	76·1
8	No manure	580·8	41·5

The produce from these plots is much greater than that from the duplicate and standard plots treated before. It should not be considered that the different kinds of fertilizers used in this case have to account for it, the true cause being that these plots, being on a slope, did not allow water to lodge in them.

After saltpetre, woollen refuse has given the best results and has again proved to be better than poudrette for maize. By the results of the past two years the conclusion can safely be drawn now that it is a good manure. If the blanket-manufacturing class in the country, who as a rule are cultivators too, may become aware

of the fact and learn it that they can utilize the waste of their manufactory in fertilizing their fields, they can derive immense good by it. They already know the effect of their sheep excrement, but do not know the value of the woollen refuse, which is simply wasted. Cow and sheep-dungs have given just equal results. Poudrette exceeds them here again. Horse-dung and pigs' droppings are still better, but this is an exception in the present case: generally they have not proved to be so. Saltpetre tops the list.

8. (c) *Brick-kiln refuse and ashes of weeds.*—These series consist of four plots. Past and present treatment stands as below:—

Table V.

No. of plot.	*Past treatment.*			*Present treatment.*				
	Year.	Manure.	Crop.	Manure.	Ploughing.	Weeding.	Irrigation.	Crop.
I ...	1881-82 ...	Dung ...	Wheat and barley.	As in table VI.	2	2	2	Maize.
II ...	1882-83 ...	Green soiled with hemp.	Oats ...					
III ...	1883-84 ...	*Nil.*	Sorgho.					
IV ...	1884-85 ...	1. Brick-kiln refuse.						
		2. Ashes of weeds.						
		3. Ditto and potassic nitrate.	Maize.					
		4. *Nil.*						

The outturn is given in the following table:—

Table VI.

No. of plot.	Manure and rate per acre.	*Outturn per acre.*	
		Grain.	Stalk and leaf.
		lb.	Mds.
1	Brick-kiln refuse, 120 maunds	387·2	54·3
2	Ashes of 120 maunds cow-dung	726 0	46·4
3	Ditto and potassic nitrate, 3 maunds	762 3	72·0
4	No manure	302·5	42·3

Brick-kiln refuse in this instance too has proved to have manurial value in it. Its quality, of course, would depend on the nature of fuel burnt in it.

Ashes of cow-dung have also always proved to act as fertilizer, but of course they are not so good as the unburnt dung.

Saltpetre in every case has shown its good effect.

9. (d) *Experiment of sowing maize after American fashion, what is called on hills, against country way of sowing.*—The idea of this method of sowing has been taken from American papers, which have highly advocated in its favour, and a trial for the first time was given to it in this season.

The plots were prepared and sown under the direction and supervision of an American gentleman named Dr. L. Hauser.

Four plots of equal size being measured off, treated as follows:—

Manure, cowdung, 200 maunds per acre.
Ploughing, three times.
Weeding, twice.

In one plot seed had been sown after plough according to the native fashion, and in three plots it was sown in lines 2, 3, and 4 feet apart. The blanks between the two lines were grubbed, and earth hills or mounds raised up around the roots of the plants which had been sown in tuft.

The following table shows the result:—

Table VII.

		Outturn per acre.	
		Grain.	Stalk and leaf.
		lb.	Mds.
1	Maize country sown 2 feet apart	2,186·9	105·8
2	Ditto 3 ,, ...	1,206·8	44·6
3	Ditto 4 ,, ...	572·2	31·0
4	Maize country sown behind plough	2,845·1	113·9

Owing to the excessive and untimely rain the seed did not germinate well : thus the loss in thinly sown plots was greater. The blanks were filled up by plants transplanted, but they did not bear good cobs. Under the above circumstances, no conclusion can be drawn safely by this first trial. In next season this would be experimented again.

10. *II.—Experiments on cotton.*—In this season cotton has given much better crop than last time. Kulpahar cotton sown broadcast heads the list.

(*a*) *Effect of deep and shallow ploughing.*—This experiment is tried in two series, A. and B., of 4 and 3 plots respectively.

There is no difference of any treatment between the two, but the area of B. series is larger than A.

In other words in (*b*) series the same experiment is confirmed in a larger scale. No manure is applied.

The other treatment is as follows :—

Irrigation	*Nil.*
Weeding	3
Grubbing	*Nil.*

Process of sowing.—The result obtained during the last two years is shown in the following statement:—

Table VIII.

No. of plot in the series.	Detail of ploughing.	Outturn per acre in 1885.		Outturn per acre in 1884.		Increase per cent. over country ploughing in 1885.		Increase per cent. over country ploughing in 1884.	
		Cotton.	Seed.	Cotton.	Seed.	Cotton.	Seed.	Cotton	Seed.
Series A.		lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
Plot I. ...	Twice with country plough, 1 foot.	185·5	338·8	36·8	78·4	...	...	...	...
,, II. ...	Once with earth-turning plough, 5 inches.	225·8	407·3	48·0	96·0	15·4	26·7	22	12
,, III. ...	Ditto ditto, 9 inches,	209·7	387·2	60·8	124·8	7·2	16·5	55	45
,, IV. ...	Twice with country plough.	205·7	371·06	41·6	92·8	...	...	...	...
Series B.									
Plot I. ...	Twice with country plough.	218·5	438·5	31·2	60·6	...	...	...	...
,, II. ...	Once to 5 inches with earth-turning plough.	223·4	549·0	34·8	70·2	2·2	50·5	11	15
,, III. ...	Once to 9 inches with earth-turning plough.	223·7	486·9	37·2	76·8	2·3	22·1	19	26

It has been confirmed again that deep ploughing with a mould board plough has great advantage over the country plough for cotton crop.

11 (*b*) *Outturn from different varieties of country and foreign seeds compared separately.*—In eight plots of the same size eight different kinds of seeds were sown all in lines, but country seed 2 feet and foreign 3 feet apart.

Other treatments were :—

Manure (poudrette)	200 maunds.
Irrigation	*Nil.*
Weedings	2

The result is tabulated as below :—

Table IX.

No. of plots in the series.	Ploughing.	Variety of cotton.	Outturn per acre.	
			Cotton.	Seed.
			lb.	lb.
Country seed.				
Series A. 1	2	Nankin cotton ...	79·7	150·2
Ditto 2	2	Country ditto ...	97·1	252·1
Ditto 3	2	Saháranpur ditto ...	143·9	330·0
Ditto 4	2	Nagpur ditto ...	81·6	178·5
Foreign seed.				
Series B. 1	2	New Orleans ditto ...	97·7	236·1
Ditto 2	2	Upland Georgian ditto ...	78 5	186·1
Ditto 3	2	Lo usiana ...	93·3	193·2
Ditto 4	2	De la Lousiana ...	89·5	213·2

Of the native varieties Saháranpur heads the list and among foreign seed De la Lousiana and New Orleans gave a larger yield.

Owing to the peculiarity of the season no stress can be laid upon the present result.

12. (*c*) and (*d*) *Effect of different kinds of sowing.*—Under this operation two varieties of cotton were experimented : (1) Kulpahar ; (2) Nankin. No manure was applied, but other treatments were just the same as in the foregoing experiments.

The operation was to sow the seed—

(1) on top of ridges ;
(2) on slopes of ditto ;
(3) in lines ;
(4) broadcast.

To compare the unmanured crop with a manured one, a plot of an equal size was manured with 200 maunds of cow-dung.

Broadcast sown plot yielded a larger crop and the manured one largest. In lines Nankin cotton thrived better. As the plants of Nankin cotton get more bushy they require more room : hence sowing in line is advantageous ; but the country variety grows thinner, so thick sowing does not prove detrimental. The results are given in the following table :—

Table X.

No. of plot in the series.	Ploughing.	Manure.	Weeding.	Seed.	Detail of sowing.	Outturn per acre in 1885.	
						Cotton.	Seed.
						lb.	lb.
Series $\frac{C}{A}$ No. 1 ...	2	*Nil* ...	2	Kulpahar cotton,	On top of ridges,	132·0	273·6
„ „ „ 2 ...	2	Do. ...	2	Ditto ...	On slopes of ridges.	124·3	241·8
„ „ „ 3 ...	2	Do. ...	2	Ditto ...	In lines ...	75·0	150·0
„ „ „ 4 ...	2	Do. ...	2	Ditto ...	Broadcast ...	219·0	462·6
„ $\frac{C}{B}$ „ 1 ...	2	Do. ...	3	Nankin cotton,	On top of ridges,	127·8	298·3
„ „ „ 2 ...	2	Do. ...	3	Ditto ...	On slopes of ridges.	134·9	300·7
„ „ „ 3 ...	2	Do. ...	3	Ditto ...	In lines ...	116·0	246·9
„ „ „ 4 ...	2	Do. ...	3	Ditto ...	Broadcast ...	116·0	243·8
„ E. „ 1 ...	2	Cow-dung, 200 maunds to the acre.	3	Ditto ...	In lines ...	229·6	500·5

13. *III.—Oilseeds.*—In connection with the forecast of oileeds, plots were made to determine the outturn of *til** sown separately and with other crops. Three varieties of *til* had been experimented upon: (1) black ; (2) white early, and (3) white late varieties.

The trial was undertaken in four series, each consisting of five plots and each plot measuring 400 square yards.

*Til=sesamum orientalis.

The result is shown in the following table :—

Table XI.

No. of plot.	Crop.	Area in square yards.	Outturn per acre.		
			Grain.		Straw (Total).
			Outturn of each crop.	Total outturn.	
			lb	lb	Mds.
A. Series 1	Til (black)	400	142·17	142 17	30 25
2	Til (ditto)	400	81·67	107·32	55·41
	Juár (*a*)		25·65		
3	Juár	400	121·0	121·0	20·2
4	Til (black)	400	*Nil.*	*Nil*	*Nil.*
	Bájra (*b*)		114·95	114·95	15·97
5	Bájra	400	169·4	169·4	25·04
B. „ 1	Tili (katkahi) (*c*)	400	*Nil.*	*Nil.*	*Nil.*
2	Tili (ditto)	400	*Nil.*	226·87	37·51
	Juár		226 87		
3	Juár	400	278·3	278·3	49·61
4	Tili (katkahi)	400	*Nil.*	205·7	lb 393·2
	Country cotton		205 7		Mds.
5	Country cotton	400	193·6	193·6	474·9
C. „ 1	Tili (Bhadeli) (*d*)	400	217·8	217·8	53·2
2	Tili (ditto)	400	157·3	210·0	18·15
	Country cotton		152·7		lb 326·7
3	Ditto	400	204·1	204·1	421·9
4	Tili (Bhadeli)	400	93·05	492·35	Mds.
	Country maize		399·3		25·65
5	Ditto	400	435·6	435·6	19·36
					lb
D. „ 1.	Country cotton	400	178 4	178·4	363·0
2	Ditto	400	134·6	134·6	279·8
	Castor		*Nil.*		
3	Castor	400	*Nil.*	*Nil.*	*Nil.*

The til, especially the " white early," was considerably damaged by the excess of rain. The results as they stand are summarized below :—

(*a*) Black til sown by itself gave larger yield than the crops of til and juár put together, which were grown in one field: so the juár sown separately has thrived better. This result leads to the idea that the native fashion of sowing til with other crops is no good.

But this may not be considered a criterion as being the first trial.

Til with bájra did not grow at all. This is due to bad season of course, but bájra sown separately has done better than sown with til, though the til did not yield anything.

(*b*) The early variety of white til totally failed to give any crop.

(*c*) Late variety of white til gave better crop than black til and has also thrived with maize well.

Castor failed to give any result.

14. *IV.—Sugarcane.*—(*a*) *Sugarcane* versus *sorgho.*—It has been said before that the bad season had effected sorgho considerably. The crop was so far injured that it was hardly fit to feed cattle upon it: the stalks turned quite red and worthless: so it was not competed with sugarcane.

(*b*) *Effect of different kinds of sowing.*—In two plots of the same size and under equal treatment sugarcane (*barokha*) was sown in two ways: (1) as in vogue in this country, *viz.*, in furrows behind ploughs; (2) on top of ridges 4 feet apart. The latter method of sowing has been brought by Messrs. Thomson and Mylne of Behea from sugarcane-growing American or French settlements and introduced into this country.

The cane were sown in rows, leaving a wide space between the two lines. The blanks were kept on grubbing and the canes earthed up each time the digging was done.

Note.—(*a*) Juár = Sorghum vulgare.
(*b*) Bájra = Penicillaria spicata.
(*c*) Katkahi = late variety.
(*d*) Bhadeli = early variety.

The following statement shows treatment and outturn :—

Table XII.

No. of plot.	Ploughing.	Manure.	Weeding.	Grubbing.	Watering.	Seed.	Detail of sowing.	Outturn per acre in 1885.	
								Cane.	Juice.
								Mds.	Mds.
1	11	Poudrette, 200 maunds per acre.	1	5	7	Barokha.	4 feet apart ...	196·2	80·1
2	11	Ditto ...	1	5	7		Behind plough,	203·1	84·5

None of the plots showed any marked superiority over the other in respect of the appearance of the cane or the quantity and quality of its juice. A little *ráb* was made from the juice of each: without any difference.

15. *V.—Miscellaneous.*—It being quite customary in the province that the cultivators in kharif prefer sowing a mixed crop of the grains specified in the following table, which mature in succession, beginning from August and lasting as late as the end of April, therefore it was resolved to determine the money value of the said outturn with a crop of wheat which is sown only once in a year.

For this a plot 2,422 yards in area of a pretty fair soil and strength was taken and sown after the country fashion :—

Treatment.

Manure	*Nil.*
Ploughing	2
Weeding	2

The following seeds were sown :—

(1) Black til (*Sessamum orientale*).
(2) Urd or mash (*Phaseolus radiatus*).
(3) Juár (*Sorghum vulgare*).
(4) Patsan (hemp).
(5) Arhar (*Cajanus indicus*).

First of all til was harvested, then other crops came in succession thus :—hemp, urd, juár, and arhar.

The result is shown in the following table. Though growing wheat looks more profitable than the mixed crop, but if the cost of irrigation be added to it the real profit will decrease considerably :—

Table XIII.

Name of grain.	Quantity of seed sown.	Outturn harvested.	Outturn per acre in lb.	Money value.	Average outturn of wheat per acre.	Money value.
	Mds. s. c.	Mds. s.		Rs. a. p.		Rs. a. p.
Til, black ...	0 0 2	35 0	69 9	3 15 0		
Urd ...	0 0 8	131 0	261 8	4 9 0		
Patsan ...	0 0 6	5 0	10 0	0 10 0	984	24 0 0
Juár ...	0 1 0	79 6	158 6	2 5 0		
Arhar ...	0 1 0	216 0	431 6	7 11 0		
				19 2 0		

16. To ascertain the outturn of certain indigenous crops they were sown again this year. Their outturn and treatment are shown below :—

Table XIV.

No of plot.	Crop.	Manure and rate per acre.	Ploughing.	Weeding.	Outturn per acre. Grain. 1884.	Grain. 1885.	Straw. 1884.	Straw. 1885.
					lb.	lb.	Mds.	Mds.
1	Kakun (*Setaria italica*) ...	*Nil*	2	2	644·4	290·4	43·0	10· 5
2	Sawan (*Panicum frumentaceum*)...	,,	2	2	192·0	508·2	19·3	12·34
3	Marua (*Eleusine coracana*) ...	,,	2	2	578·4	459·8	36·3	32·67
4	Kodon (*Paspalum scrobiculatum*),	,,	2	2	708·0	151·25	16·3	12· 7
5	Urd (*Phaseolus radiatus*) ...	,,	2	2	366·0	121·0	25·5	12· 1
6	Mung (*Phaseolus mungo*) ...	,,	2	2	180·0	375·1	57·0	24·41
7	Moth (*Phaseolus aconitifolius*) ...	,,	2	2	204·0	217·8	47·8	16· 4
8	Lobia (*Vignacatiang*) ...	,,	2	2	636·0	381·15	44·5	25·41
9	Bhutwas	,,	2	2	...	805·15	...	25·65
10	Sanai (Bhadeli)(*Crotalaria juncea*),	,,	2	*Nil*	...	217·8	...	...
11	Do. (Katkahi)(*Ditto*),	,,	2	*Nil*	...	193·6	...	...

Owing to the difference of season the result has come out quite different from that of the last year.

Some crops suffered by the excess of rain and gave very poor outturn, while others profited by it and yielded more.

This clearly proves the effect of the season on agricultural success.

All plots had been sown unmanured, and the result of the unmanured plots of the last year is compared with them. The weeding was done twice this year, while only once last year. Other treatments in both years were the same.

17. *VI.—Ensilage.*—To confirm the previous experiments five silos had been filled with the following stuff:—

(1) With common succulent grasses of early rainy season filled in clear weather: rapid-filling process.

(2) With common succulent grasses of late season stored in rainy days: slow-filling process.

(3) Guinea-grass.

(4) Guinea-grass, juár cut as chari, *viz.*, before bearing cobs.

(5) Guinea-grass, juár cut as chari, *viz.*, after bearing cobs.

The following table gives details of cost :—

Table XV.

No. of silo.	Form of silo.	Date of filling.	Date of opening.	Cost of digging.	Cost of chappar.	Cutting grass and cost of chopping of jaru.	Cost of filling, weighing, and treading.	Fodder filled in.	
				Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.		M. s. c.
1	Circular, 6 feet diameter, 10 feet deep.	17th	16th	1 8 0	6 8 6	4 3 0	1 2 0	Common grass in clear weather,	59 25 8
2	Ditto ...	16th	Do.	1 10 0	6 10 6	4 3 0	0 14 6	Ditto in rainy weather ...	60 22 0
3	Ditto ...	21st-23rd Sept.	Do.	1 12 0	7 8 0	3 4 9	1 13 6	Guinea-grass ...	76 38 1
4	Ditto ...	25th-26th	Do.	0 10 0	...	2 8 0	1 7 9	Juár cut as chari, *viz.*, before bearing cobs ...	52 0 0
5	Ditto ...	...	Do.	0 10 0	...	2 6 6	0 3 0	Do. after cobs ...	60 32 0

18. The chappar which was put to cover the pit to prevent water going in was by itself an object of experiment.

It was made of the water-proof Willesden paper, which is so highly spoken of throughout the world. A wooden frame being made was covered with this paper, and

it served the purpose of a moveable chappar, the cost of the frame only has been shown in the statement.

The frames were from 6 to 8 feet by 4 feet, the cost of paper is Re. 1 per square yard. The result of this will be mentioned under the head of experimental machinery and appliances.

19. All the silos were opened one day, *i.e.*, on the 16th of April last, when there was a meeting of the Agricultural Association. Every stuff came out as good and with as little of its characteristic smell as could be and was decidedly of the best quality.

20. This year, at the desire of the Government, measures were taken to get the experiment confirmed by and have the idea spread through the co-operation of a few private persons in different districts. The instructions appended at the end of this report were issued and the assistance of the Committee of Meerut Demonstration Station ; of Pandit Ajudhia Prashad, the Honorary Assistant Director ; of Kuar Lutf Ali Khan of Chhatari and of Muhammad Ali Khan of Aligarh, was requested. The result of this is a matter of a separate report, which will be submitted so soon as the reports have been received from the above-named gentlemen.

21. There is one thing quite novel and worth noting here for drawing attention of the public to it, *i. e.*, some of the silos filled in the year 1884, not being used, were kept closed till 18 months after they were stuffed. They were of juár chari and one of grass. In the middle of February last a grass and a juár pit was opened. The grass seemed to have been spoilt, but the ensilage of juár was as good as of a fresh silo a month old. The cattle greedily ate it.

The stock of fodder for farm cattle had exhausted, and it was intended to purchase a quantity of *bhúsa* enough to last till the following rabi harvest, as the new silos, which had been filled in about that time, were not ready to be opened. But when it was found that the cattle had eaten the old stuff heartily, the idea of purchasing fodder was given up, the beasts for last two months had entirely been fed on the ensilage 18 months old. This stuff made the staple food of them throughout the autumn season, only now and then some green weeds from rabi fields or sliced turnips and carrots which were grown on farm were mixed with it.

The cattle undoubtedly looked very much improved in condition and seemed to have gained flesh ; of course they had no hard work in those days.

There is no arrangement on farm for weighment of the cattle and no laboratory to find out the feeding value of the two stuffs; however, arrangement is being made to feed in stall two lots of young bullocks, six in each lot, and four cows on the two kinds of ensilage (new and old). The stuff will be given alone as well as mixed with other food and the result of the experiment will be recorded as far as perceptible.

The following figures will show the physical differences which have been noted between the two ensilaged stuffs :—

Table XVI.

Description of silo.	Temperature under 14 inches, the mean at the time being 84° in shade.	Weight per bushel of fresh stuff.	Weight per bushel of the sun-dried stuff.	Weight of ashes.	Remarks.
		lb. oz.	lb. oz.	lb. oz	
Opened after 18 months,	100°	12 1½	5 4	0 12	Fresh stuff taken out of silos and given to cattle ; who did not care much for the old one in preference to the new ensilage.
Ditto 9 ditto,	87½°	18 14	7 12	1 2	

22. *VII.—Implements and appliances.*—This subject is treated in a separate report submitted to Government annually, but briefly it is noted here also as usual.

It may be noticed that decisive opinion cannot safely be formed by giving a machine one trial; it requires some time to learn its real merits.

During the year the undermentioned implements and machines were tried.

23. (*a*) Rogers' improved patent sugar-mill.
(*b*) The centrifugal sugar purifier.
(*c*) The Behea shallow pan (sugarcane juice-boiler).
(*d*) Bull's new patent dredger.
(*e*) The new Barakar plough.
(*f*) Willesden paper.

(*a*) *Rogers' mill.*—This has been competed with the old Behea and the Fakir Muhammad's (of Roorkee) pinionless grooved rollered mill.

The result stands as recorded below:—

Table XVII.

Description of mill.	No. of trial.	Length of beam or lever.	Tension. Without cane.	Tension. With cane.	Variety of cane crushed.	Weight of cane pressed.	Time when pressing commenced.	Time when pressing ended.	Duration during which the mill worked.	Weight of juice expressed.	Weight of megass.	Weight of megass particles held in the juice.	Percentage of juice on the weight of cane crushed.	Weight of cane crushed per hour.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Ft. in.				Mds. s. c.	H. m.	H. m.	Minutes.	Sr. c.	Sr. c.	Sr. c.	Mds. s.	Mds. s.
Rogers ...	I.	8 0	2°	9°		1 0 12	11 15	11 56	41	22 2	18 10	...	...	...
	II.	...	...	...		1 0 14	1 35	2 10	35	21 8	19 6	0 1	...	...
	III.	...	...	...		10 0 10	3 20	3 58	38	21 14	18 12	...	...	...
Average ...	...	...	...	...		1 0 12	...	...	30	21 13	18 15	...	53 5	1 61
Thomson and Mylne's 6" Mill.	I.	7 9	2°	5°	Chani.	1 1 8	11 15	11 53	30	20 14	20 10	0 0½	...	...
	II.	...	...	...		1 0 6	1 35	2 14	39	20 8	19 14	...	...	...
	III.	...	...	...		10 0 12	3 20	3 55	35	20 6	20 6	...	...	...
Average ...	...	...	...	...		10 0 14	...	...	37	20 9	20 5	..	50 3	1 66
Fakir Muhammad's spiral Mill.	I.	7 8	2°	9°		1 0 6	11 15	12 0	45	20 10	19 12	...	...	...
	II.	...	...	...		1 0 4	1 35	2 9	34	20 12	19 8	...	...	...
	III.	...	...	...		1 0 12	3 20	3 55	32	20 12	20 0	0 1	...	...
Average ...	...	...	...	...		1 0 7	...	...	37	20 11	19 12	...	51 2	1 64

*Degrees of dionometer.

Decidedly Rogers' mill is greatly improved, and since it has been more so, the friction seems to have been reduced in it to the lowest point. The arrangement of keeping the lever loose and playing over spindle's head reduces the liability of breaking it. The spindles at the bottom rest on two brass screws, by turning which the cylinders are regulated in vertical directions, and by this arrangement the pinions or cog-wheels of the rollers remain true to each other: hence there is less danger of damage.

Between the bearing and spindles a very simple kind of washers are inserted, which reduce the friction and keep the parts clean and lubricated.

Moreover, the patentee alludes that he is to get the best steel rollers oil tempered from England, which certainly would add a good deal to the stability of the machine. Lately the rollers had been shown in Moradabad Show.

Under the circumstances, it can safely be said that the Rogers' mill has proved to be better than the mills competed with. One or two disadvantages which attracted the attention are:—

(1) The weight of the mill: as its whole frame is made of rail iron, so it makes it too heavy and not so easy to carry about as the wooden-framed mills are, but at the same time it is much more durable. The weight has been much reduced since, still it is comparatively heavier.

(2) Its construction looks to a new and inexperienced eye complicated. Perhaps necessarily the use of nuts and bolts has been made more than in the machines yet

APPENDIX I.

Programme for Kharíf 1885.

I.—Manures to be tried, as in the last year, on the plots called kharíf and alternate, *vide* paragraphs 2 and 3 of last report.

2. Brick-kiln refuse and ashes of weeds as in the last year in F. 28, Table VI., page 5.

3. Different kinds of dung, woollen refuse and saltpetre in A plots, *vide* page 4 of the last report.

II.—Deep and shallow ploughing experiments to be continued in the A. C. plots, *vide* paragraph 5 of last report, Table VII.

III.—Sowing of cotton in line, &c., and broadcast in F. 15.

IV.—Maize in the American fashion in F. 14.

V.—Sorghum, half of F. 28,
Ditto F. 14;
Whole F. 26.

VI.—*China grass.*—In F. 90 a little under shade and F. 89 and 73.

VII.—*Cottons.*—American and Indian in 8 plots, F. 16 and 17.

VIII.—*Til.*—In the various ways sown by natives to determine their yield.

IX.—*Castor.*— Ditto ditto ditto.

X.—*Millets and kharíf pulses.*—To determine their yield in plots made for them last year, *vide* page 7 of last year's report.

XI.—*Juár for ensilage.*—In Collector's Bagh and the ground between the office and the garden.

XII.—*Sugarcane.*—Half of F. 20.

XIII.—*Sanai for manure for wheat.*—In F. 21, 22, and A. (*a*) plots.

XIV.—In a field of about one or half an acre a mixed crop of juár, urd, til, *san* and arhar be sown after native fashion, to be followed by sawan or maize in the hot months, when all these crops are off the ground, and in the rains next by kakun and makra after a strong dose of some strong manuring, and in the rabbi by peas and so on, to keep the land always under one crop or the other. Its income during a year to be compared with the income from wheat which is sown after a year's fallow.

*XV.—In two big fields the several varieties of American tobacco, seed of which has been received this year, should be planted along with two good country varieties to compare their outturn; the produce of each plot to be cured after the American fashion.

*XVI—In one plot *san* to be sown very early, to be followed by barley and subsequently by rye grass, which is to be sown as a catch crop, and the income from the three to be compared with that from a single crop after a bare fallow.

XVII.—A small heap of compost manure to be made for trial during the next rabi—*Composition*:—

(1) Weed from kharíf fields.
(2) Unslaked lime.
(3.) Stable refuse.
(4.) Road-sweeping (if available).

XVIII.—On a very small plot of known dimension maize plants to be transplanted when about 6 inches high, to see whether they bear transplanting. A little farmyard manure to be applied to each plant at the time it is transplanted.

* This will go in the rabi report.

APPENDIX II.

Note on Bull's Improved Dredger by Mr. Copeland.

This dredger was tried on a well in Rawatpur, in the district of Cawnpore, which had silted up and was 55 feet deep.

The dredger worked particularly well, coming up on each occasion quite filled with silt, except when a piece of Kankar got jammed between the scoops, when it came up empty.

The dredger was emptied eight times in 20 minutes and came up twice empty. It would work much faster when the workmen have got used to the machine. The only fault that can be found with the machine as a whole is with the frame-work, which is very weak, ill-fitted, and shaky.

The dredger, therefore, is a very good one and will do at least four times the quantity of work with fewer men, but the frame is decidedly weak and badly fitted.

Instructions for ensilaging the luxuriant vegetation of the rains.

1. *Nature of pits.*—Experiments to be tried in earthen pits or holes dug down into the ground.

2. *Site for the pits.*—The ground selected for making these pits should be a little higher than the general level of the surrounding ground, and should possess an easy drainage, so that in the event of any heavy rains water may not lodge over the pits.

3. *Number of pits.*—Four pits to be made in all. One in August, one in September, one in October, and one in November.

4. *Shed.*—Over the pits made in August and September a cheap *chappar* should be thrown like the temporary sheds made by cultivators in their fields to shelter them against the rains, when they watch their crops during the period of their ripening. No shed to be made over the pits dug in October and November.

5. *Form of the pits.*—The pits should all be cylindrical and their sides should be a little sloping.

6. *Size of the pits.*—Each pit should be 10 feet deep, unless the distance of water in the neighbouring wells should be less than 15 feet from the surface of the ground, in which case the depth of the pit should not exceed 6 feet. The diameter of the pit at its mouth should measure 7 feet and at its bottom 5 feet.

7. *Crop to be ensilaged.*—The grasses which spring up spontaneously during the rains should be ensilaged, care being taken that only those grasses are put in which are eaten by bullocks or horses.

8. *Cutting.*—The grass should be cut with a *hansia* (sickle) leaving an inch or two from the ground, so that the stuff ensilaged should not get muddy.

9. *Chopping.*—The grasses should be packed entire without any chopping.

10. *Weighing, filling, treading, and closing.*—As soon as the grasses are cut, they should be carefully weighed and then thrown into the pit, four or five men being at the same time directed to get down into the pit and to level and tread down the grass as each load is thrown into the pit. Thirty or forty maunds should thus be ensilaged on the first day. This weight should fill nearly half of the pit. After the mass has been trodden down for about an hour, a layer of earth two feet thick should be placed over it, and the pit should thus remain closed for 48 hours. It should then be opened and the mass trodden down to press out the air and the gaseous compound which may have formed during this interval. The top layer with which earth may have mixed up should be carefully removed and its weight deducted. A second filling should then be made exactly like the one made on the first day till the pit is completely filled, when all the earth dug out of the pit should be piled over it in the form of a sloping mound. As the fodder settles the pile of earth will sink down, and openings and cracks will be noticed, especially around the edges. Care should be taken to close these cracks as soon as noticed.

11. *Time of opening.*—No pit should be opened before four months from the date of its closing.

12. *Weight of fodder preserved in good condition.*—The weight of the portion which should be found to have become mouldy should be carefully determined separately from the weight of the portion found in good condition, and a cubic foot of the fodder from each silo should be sent to this Department for inspection as soon as any silo is opened.

APPENDIX III

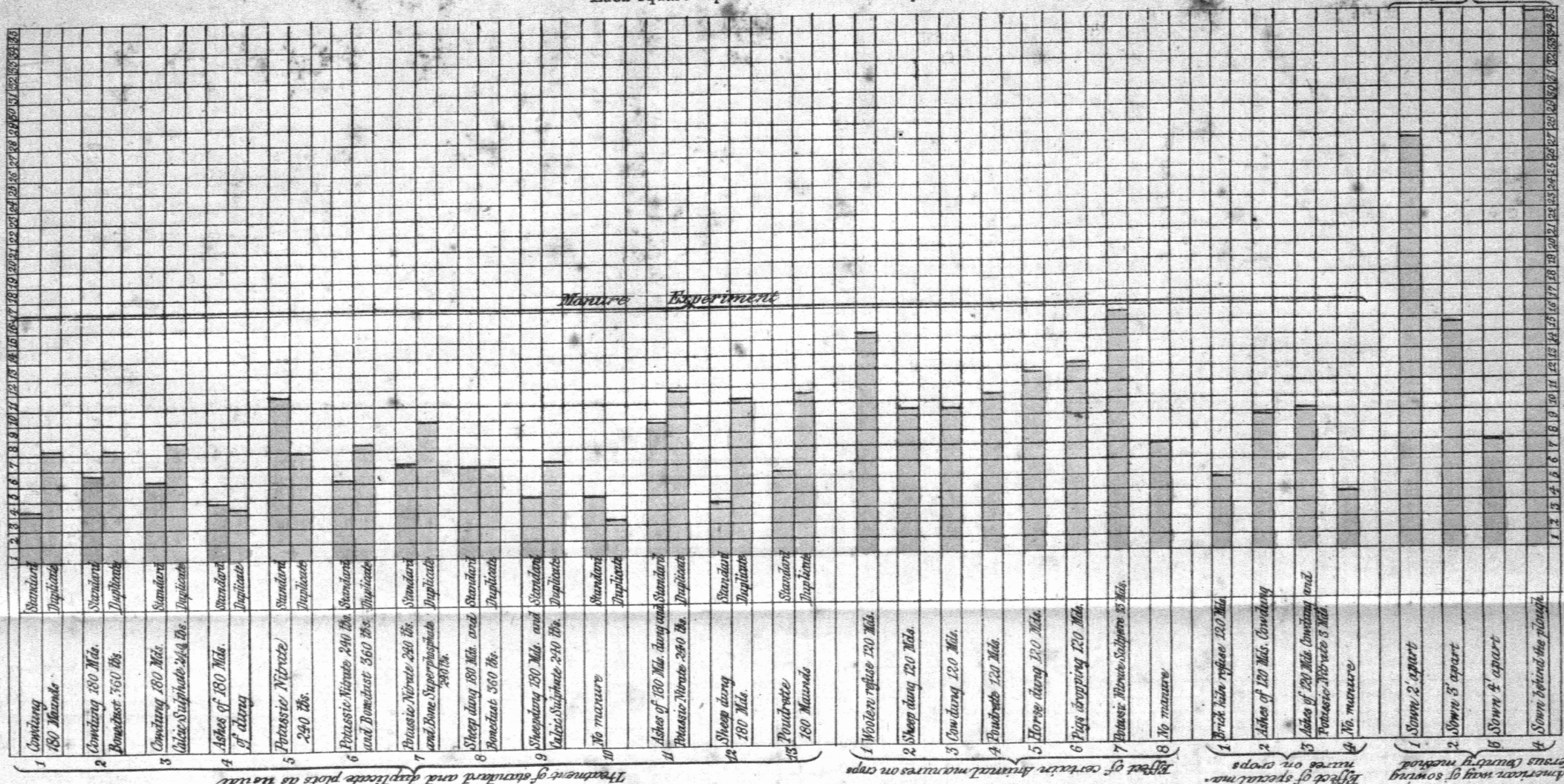
KHARIF, 1885.

Chart showing the result of manure and sowing experiments.

CROP EXPERIMENTED UPON—MAIZE.

Each square represents one maund of produce.

NOTE.—The chart shows the yield of grain only. In every case yield per acre has been given.

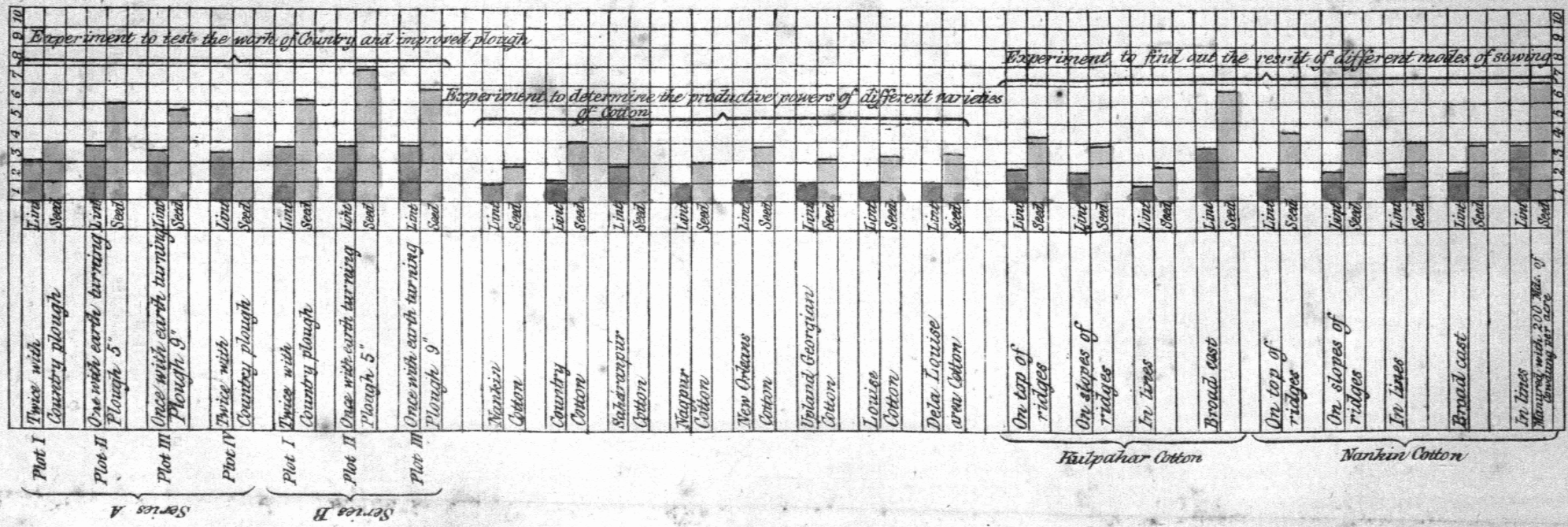


APPENDIX IV

KHARIF, 1885.

CROP EXPERIMENTED UPON—COTTON.

The Outturn in every case is given per acre.
Each square represents one maund.


Experiment to test the work of Country and improved plough
Experiment to determine the productive powers of different varieties of Cotton
Experiment to find out the result of different modes of sowing
Series A
Plot I Twice with Country plough
Plot II One with earth turning Plough 5"
Plot III Once with earth turning Plough 9"
Plot IV Twice with Country plough
Series B
Plot I Twice with Country plough
Plot II Once with earth turning Plough 5"
Plot III Once with earth turning Plough 9"
Nankin Cotton
Country Cotton
Sahiranpur Cotton
Nagpur Cotton
New Orleans Cotton
Upland Georgian Cotton
Louise Cotton
Dela Louise new Cotton
Kaitpahar Cotton
On top of ridges
On slopes of ridges
In lines
Broad cast
Nankin Cotton
On top of ridges
On slopes of ridges
In lines
Broad cast
In lines Manured with 200 Mds. of Cowdung per acre
Line
Seed